

[0026] In the embodiment shown, the air valve 30 is a solenoid valve and is actuated by a controller 60 configured to operate the valve 30 such that a desired pressure is provided to the dispensed liquid material 12 at a desired pulse frequency to thereby create a desired pattern on the moving substrate 14. The controller 60 for the air valve 30 may be independent or may be combined with a control unit 62 which actuates the liquid valve 28.

[0027] In the exemplary embodiment shown in FIG. 1, the air valve 30 is positioned within the air manifold 20, adjacent to the nozzle 44, to minimize the distance between the air valve 30 and the nozzle 44 such that more robust control of the pulsed air may be maintained. Alternatively, the air valve 30 may be provided between the process air supply 24 and the air manifold 20, as shown in the embodiment of FIG. 5, wherein components similar to those described above have been similarly numbered. In this embodiment, the air manifold 20a comprises a flat plate heater, such as that described in U.S. Patent Application Serial No. 10/282,573, assigned to the assignee of the present invention. Advantageously, the small dimensions of the air passage 64 in the flat plate heater allow robust control of the pulsed air provided to the nozzle 44.

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[0028] In another aspect of the invention, a method of dispensing liquid material 12 to a substrate 14 comprises dispensing the liquid material 12 from a liquid discharge outlet 50, directing a stream of pressurized air toward the dispensed liquid material 12, and varying the pressure of the pressurized air to create a desired pattern of dispensed liquid material 12.